



Biomass Program

A New Biorefinery Platform Intermediate

Cargill, in collaboration with Codexis, Inc., a leader in DNA evolution technology, and Pacific Northwest National Laboratory (PNNL), will develop a new biobased platform technology to produce a portfolio of products based on 3-hydroxypropionic acid (3-HP).

At the core of the technology platform will be the fermentation of carbohydrates to produce 3-HP, which can then be converted to other important chemicals such as acrylic acid and its derivatives, 1,3-propanediol, plastics based on 3-HP, and various other high-value chemical products.

The objective of research is to develop an effective fermentation organism and process for 3-HP production. Work will include optimization of organisms for efficient industrial-scale production of 3-HP, and development of viable catalysts for downstream conversion of 3-HP to valuable products. Ultimately, researchers hope to finalize a process design that will be suitable for pilot testing and ultimately scale-up for industrial production.



Biomass resources, including crop residues, will serve as the feedstock for a variety of high-value chemicals.

R&D Pathway

Codexis, a subsidiary of Maxygen, Inc., will optimize the genes and pathway for production of 3-HP. Cargill will then work to optimize the organism and fermentation process. In the second phase, Cargill will partner with the Chemical Process Development Group at PNNL to screen catalysts and develop process flowsheets, simulations, and economic estimates for a number of 3-HP derivatives.

Integrated Biorefineries R&D

Benefits

- **Cost-effective production of chemicals and materials via biomass-based feedstocks, enabling displacement of petroleum feedstocks**

Applications

Development of 3-HP, a platform intermediate, will enable the future production of a number of valuable chemicals and materials, including acrylic acid, polymers, and many others.

Project Participants

Cargill, Inc.
Codexis, Inc.
Pacific Northwest National Laboratory

Project Period

FY 2003 – FY 2007

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April 2006